[0030] Fig. 1 shows an example of configuration of the transmitter composing the transmitter-receiver system of the present invention. In the program generating unit 11 of this transmitter 1, the data (audio data and video data) of the program to be broadcast is generated. The main system processor 12 supplies the program data supplied from the program generating unit 11 to the encoder 13 to be encoded. Simultaneously, the main system processor 12 generates and supplies reference clock, time information, etc. to the system information processor 15, operation system processor 16, EPG system processor 17, multiplexer 14, etc. The encoder 13 encodes the program data supplied from the program generating unit 13 through the main system processor 12 according to the method of MPEG, for example, and outputs the encoded data to the multiplexer 14.

[0031] The system information processor 15 is arranged to generate system information and control the multiplexing process of the multiplexer 14. The operation system processor 16 is arranged to process the command in response to the input from the keyboard, mouth, etc. (not illustrated), and outputs the command to the main system processor 12 as necessary.

[0032] The EPG data supplying unit 18 is arranged to generate EPG data and output it to the editing unit 19. In case the

individual program has a feature and if a user wants to display feature recognition information additionally to the EPG of the program, the editing unit 19 generates a program flag indicating such the intention and inserts this into the EPG. The EPG system processor 17 processes the EPG data supplied from the editing unit 19 synchronously with the signals supplied from the main system processor 12 and outputs the processed data to the multiplexer 14. The multiplexer 14 is arranged to synthesize the program data composed of the audio data and video data supplied from encoder 13 and the EPG data supplied from the EPG system processor 17 to output as transport stream to the satellite not illustrated.

[0033]

Fig. 2 shows an example of configuration of the receiver that receives the data transmitted via satellite from the transmitter 1 illustrated in Fig. 1. The receiver 13 is arranged to receive the radio wave transmitted by a tuner 41 via satellite and output the received signal to a demodulating unit 42. The demodulating unit 42 demodulates the signal supplied by the tuner 41 and outputs the demodulated signals to a demultiplexer 43. The demultiplexer 43 extracts audio data and video data composing the program data from the data inputted from the demodulating unit 42 while extracting EPG data. Audio data is to be supplied to a decoder 46, video data to a video decoder 45, and EPG data to a control CPU 44, respectively.

[0034]

The audio decoder 46 is to decode the inputted audio data and output the decoded data to ,for example, a VCR (Video Cassette Recorder) 63 or a monitor 62, each connected to the receiver 31. The video decoder 46 decodes the inputted video data and outputs the decoded data to the display converter 47. The display converter 47 reduces the size of image to a predetermined size based on the video data supplied from the video decoder 45 in accordance with the control from the control CPU 44, and outputs the image to the display processor 48. And the display converter 47 outputs the video data signals to the VCR 63 with the size of image not reduced.

[0035]

An OSD control unit 49 is controlled by the control CPU 44, and generates OSD (On Screen Display) data to be superimposed on video data and outputs it to display processor 48. The display processor 48 is arranged to synthesize the video data supplied from the display converter 47 with the OSD data supplied from the OSD control unit 49 under the control of the control CPU 44, and outputs the synthesized to the monitor 62.

[0036]

In the symbol memory 50 for program flag is stored the data of symbol (feature recognition information) to be superimposed on EPG in accordance with program flag. The EPG data memory 51 stores the EPG data supplied to the control

CPU 44 from the demultiplexer 43. The program memory 52 stores the program that is necessary when the control CPU 44 executes various processes. A work memory 53 properly stores the data or program that is necessary when the control CPU 44 executes various processes. The operating unit 54 receives the infrared signal inputted from a remote controller 61, or the input from the button, switch, etc. (not shown) installed in the main body of the receiver 31, and outputs the detection signals to the control CPU 44.

[0037]

Fig. 3 shows an example of configuration of the display converter 47. A display size converter 81 reduces the size of one picture composed of brightness signal Y, color difference signal Cb(B-Y) and Cr(R-Y) that are supplied from the video encoder 45 to a predetermined size in accordance with the command from the control CPU 44, and outputs to a video encoder 82. The video encoder 82 outputs the video data inputted from display size controller 81 to D/A converter 83 after converting it to video data of NTSC mode, for example. The D/A converter 83 performs D/A conversion of the inputted video data and outputs it to the display processor 48. The display processor 48 processes inputted video data and synthesizes the symbols (graphics) corresponding to the EPG supplied from the OSD control unit 49 as mentioned above, and outputs the result to the monitor 62.

[0038]

Meanwhile, the video data inputted from the video

decoder 45 is converted into video data of NTSC mode by the video encoder 84. Subsequently, converted into analog signals with the D/A converter 85, and the supplied to the VCR 63. The video signal supplied to this VCR 63 does not pass through the display processor 48, so they become a video signal that does not contain EPG.

[0039]

To the display converter 47 is connected SDRAM 91 as the memory that temporarily stores the image data when the display size converter 81 changes the display size.

[0040]

Next, the operation thereof will be described. The program data generated from the program generating unit 11 is supplied to the encoder 13 through the main system processor 12 and is then encoded. Meanwhile, the EPG data supplying unit 18 generates the EPG data of, for example, the program for 2 weeks planned to be broadcast, and outputs this to the editing unit 19. The editing unit 19 executes the editing process of the EPG data. Here, in case of the program has a feature different from another program, a program flag is added to the EPG data for superimposed display of feature recognition information to make the viewer recognize the feature.

[0041]

Fig. 4 shows an example of the program flag. As illustrated in this figure, when the programming title of the program, broadcasting start time, and other EPG data have

been supplied, the discount flag for superimposed display on EPG of the feature recognition information (a discount mark to be mentioned later) indicating that the program is set at a charge lower than another program, or the last flag for superimposed display on EPG of the feature recognition information (a last mark to be mentioned later) indicating that the program is the last program as a program composing NVOD, is added.

[0042]

Further, the format shown in Fig. 4 is defined with DVB (Digital Video Broadcasting)_SI.

[0043]

The EPG system processor 17 processes the EPG data supplied from the editing unit 19 into predetermined format, then outputs the processed data to the multiplexer 14.

[0044]

The multiplexer 14 packetsizes the program data supplied from the encoder 13 and the EPG data supplied from the EPG system processor 17, synthesizes them into transport stream, and transmits the transport stream toward satellite.

[0045]

The editing unit 19 may set, besides the discount flag and last flag, a special program flag indicating that the program is a special program, an exclusive program indicating an exclusive program, a live flag indicating a live program, or a last-round flag indicating the last round of a serial program, etc as illustrated in Fig. 5, for example.

[0046]

In the receiver 31, the control CPU 44 controls the tuner 41 in accordance with the command from the remote controller 61 or the operating unit 54, and receives a signal of a predetermined transponder of the satellite. The demodulating unit 42 demodulates the signal outputted from the tuner 41 and outputs the demodulated signal to the demultiplexer 43. The demultiplexer 43 extracts audio data, video data and EPG data from the data supplied from the demodulating unit 42, and outputs them the audio decoder 46, the video decoder 45, and the control CPU 44 respectively.

[0047]

The audio decoder 46 decodes the packet of inputted audio data and outputs the decoded data to the VCR63 and the monitor 62. The video decoder 45 decodes the video data of the inputted video packet and outputs the decoded data to the display converter 47.

[0048]

The display size converter 81 of the display converter 47 stores inputted video data into the SDRAM 91 and executes the process of changing to the display size corresponding to the command from the control CPU 44. And, after the video data whose display size is changed to a predetermined one is converted to video data of NTSC mode with the video encoder 82, the video data is D/A converted with the D/A converter 83 and inputted to display processor 48.

[0049]

And, the video encoder 84 of the display converter 47 encodes the video data inputted from the video encoder 45 into the video data of NTSC mode without changing the display size and outputs the encoded data to the D/A converter 85. The D/A converter 85 D/A converts the inputted video data and outputs the converted data to the VCR 63.

[0050]

The control CPU 44 stores the EPG data supplied from the demultiplexer 43 into the EPG data memory 51.

[0051]

And, when the predetermined command is inputted from the remote controller 61 or the operating unit 54, the control CPU 44 reads the EPG data stored in the EPG data memory 51 and outputs it to the OSD control unit 49. The OSD processor 49 converts the inputted EPG data into image data and outputs the image data to the display processor 48. The display processor 48 outputs to the monitor 62 the image data supplied from the OSD control unit 49 only or by superimposing it on the video image data supplied from the display converter 47, thereby displaying the EPG image on the monitor 62.

[0052]

In addition, when the EPG is displayed on to monitor 62, the control CPU 44 determines whether a program flag is contained or not, and if a program flag is contained, the CPU reads the corresponding symbol data from the symbol memory 50 for program flag, and outputs it to the OSD control unit 49.

The OSD control unit 49 generates the image data of this symbol and superimposes the generated data on the EPG image data to output and to display on the monitor 62 through the display processor 48.

[0053]

In the above-described manner, the EPG is displayed on the monitor 62 as illustrated in Fig. 6, for example. In this example, the display indicates that the program A is NVOD-broadcasted on 107th channel to 110th channel. And, the program A broadcasted from 8 o'clock on 107th channel among the channels indicated shown to be a live broadcast program by the symbol "Live Broadcast".

[0054]

In addition, program B is being NVOD-broadcasted on 111st channel to 114th channel four times. And in the program broadcasted on 113rd channel, which is the second from last among four, the symbol "discount" is displayed indicating that a charge lower than other programs is set. And in program B on 114th channel, the symbol "last" is displayed indicating it is the last program of NVOD.

[0055]

Further, in the example of display in Fig. 6, program C is being NVOD-broadcasted repeatedly on 115th channel, and in the program C of the last two times, the symbol "discount" is displayed indicating that a charge lower than the programs of the first two times is set.

[0056]

Next will be described the process of the control CPU 44 for displaying on monitor 62 the EPG illustrated in Fig. 6, with reference to the flow chart of Fig. 7 (Also have this process may be also executed on the OSD control unit 49). First in step S1, the control CPU 44 draws the frame of the EPG as illustrated in Fig. 6. Then, the process proceeds to step S2 to read the information of the program to be displayed from the EPG data memory 51. In step S3, the control CPU 44 draws the program title read in step S2 on VRAM built in the OSD control unit 49 in accordance with the corresponding time.

[0057]

Next, in step S4, the control CPU 44 determines whether a program flag exists or not in the information read in step S2. If a program flag exists, the process proceeds to step S5, and the control CPU 44 reads the symbol data corresponding to the program flag from the symbol memory 50 for program flag, and in step S6 synthesizes this data on the title drawn in step S3. Accordingly, the EPG on 107^{th} channel in Fig. 6 for example is drawn on VRAM.

[0058]

And in step S4, if it is determined that a program flag does not exist, the processes from steps S5 to S6 are skipped.

[0059]

Next, in step 7, it is determined whether the titles corresponding to all display units of the frame are drawn or not, and if there are remaining any display units not drawn,

the process returns to step S2 to execute the processes after that repeatedly. With this processing, drawings of EPG of 108^{th} channel to 115^{th} channel in Fig. 6 are executed in sequence. And in step 7, if it is determined that the drawing of all titles corresponding to all the display units of frame is completed, the process proceeds to step S8, and the control CPU 44 controls the OSD control unit 49 to read the image data drawn on VRAM, and outputs the data to the monitor 62 through the display processor 48 to display it. Eventually, the EPG as illustrated in Fig. 6 is displayed on the monitor 62.

Translation of Drawings

[Fig. 1] Transmitter 1

11: program generating unit, 12: main system processor, 13: encoder, 14: multiplexer, 15: system information processor, 16: operation system processor, 17 EPG system processor, 18: EPG data supplying unit, 19: editing unit, arrow: transport stream.

[Fig. 2] Transmitter 31

41: tuner, 42: demodulator, 43: demultiplexer, arrows: tuning control(44 41), EPG data(43 44), video data(43 45), audio data(43 46), 50: symbol memory for program flag, 51: EPG data memory, 52: program memory, 53: work memory, 54: operating unit, 61: remote controller, 44: control CPU, 45 video decoder, 46: audio decoder, 47: display converter 49: OSD control unit, 48: display processor, 62: monitor

[Fig. 3]

arrow to 47: From control CPU 44, arrow to 81: V/Cb/Cr from video decoder 45, 81: display size converter, 82: video encoder, 84: video encoder, 48: display processor, 47: display converter

[Fig. 4]

Program title Start time Discount flag Last flag Other	Program title Start time Discount flag Last flag Other	Program title Start time Discount flag Last flag Other	

→ Time

[Fig. 5]

Kind of attribute	Attribute data	Description
Program content attribute		Assigns program content attribute
	S.P.	Special program
	Exclusive	Exclusive program
	Live Broadcast (Live)	Live broadcast
	No Cut	Shows no-cut broadcasting of movie, etc.
	Special	Special program
	Feature	Feature program
	Urgent	Urgent broadcasting
	Prompt Report	News flash
	Recommended	Program recommended by station, attached with recommended grade
	Series	Series program
Program operation attribute		Shows the attribute of program operation
	New Program	Shows mainly the first broadcasting of series program
	Rebroadcast	Rebroadcast
	Last Round	The last round of series program
	LAST	Last broadcast of NVOD
	Discount	Shows PPV broadcast at a charge lower than the original
Program mode attribute		Assigns the attribute of program mode
	HD Broadcast	Broadcasting in high definition mode
	Multi Angle	Multi-angle broadcasting
	Digital Sound	Digital sound broadcasting
	Interactive	Two-way service broadcasting
	Data Broadcast	Shows the program is in data broadcast
	Sound	Shows the program is broadcast in

	Broadcast	sound only
	Monochrome	Monochrome broadcast
	Stereo	Stereo broadcast
	Subtitle	Indicating a program with subtitle
	Wide	Wide broadcast
	Bilingual	Bilingual broadcast
	Multilingual	Multilingual broadcast
	Finger Language	Broadcasting with finger language
	Non Scramble	Non-scramble broadcast
	Scramble	Scramble broadcast
Text attribute		Assigns text attribute of EPG program title
	Character Color	Assigns type color of title letters
	Under Line	Assigns underline of title letters
	Italic	Assigns italic type of title letters
	Bring	Assigns bring of title letters
	Background color	Assigns the background color of title letters
	Bold Type	Assigns bold type of title letters

[Fig. 6]

Channel Frame Broadcast time

CH	8:00	9:00	10:00
107 Asahi	Program title A Live broadcast		Program title A
108 Asahi	Program title A		Program title A
109 Asahi	Program title A		
110 Asahi	Program title A		
111 Japan	Program title B		
112 Japan	Program title B		
113 Japan	Program title B		
114 Japan	Program B		
115 STV	Program title C	Program title C	Program title C	Program title

[Fig. 7]

EPG display process start

S1 Draw frame of program table

S2 Read information of program to be displayed

S3 Draw title

S4 Is there program flag?

S5 Read symbol data corresponding to program flag

S6 Synthesize symbol data on program title

S7 Are titles drawn for all displaying units of frame?

S8 Output, display

END

[Fig. 8] (also see a copy of JP-A-11-234648)

103: description (besides content, broadcast time) of program title G instructed by pointer,

104: program advertising of the channel being tuned etc.

[Fig. 10]

Program title Start time Last start time Other	Program title Start time Last start time Other	Program title Start time Last start time Other	

→ Time

[Fig. 9]

Channel	Frame	Broadcast time	
CH	8:00	9:00	10:00
107 Asahi	Program title A	Program title A	
108 Asahi	Program title A	Program title A	
109 Asahi	Program title A		
110 Asahi	Program title A		
111 Japan	Program title B		
112 Japan	Program title B		
113 Japan	Program title B		
114 Japan	Program B		
115 STV	Program title C	Program title C	Program title C	Program title

[Fig. 11]

EPG (LAST OF NVOD) display process start

S21 Output frame of program table

S22 Read information of program to be displayed

S23 Draw title

S24 Program of NVOD?

S25 Does start time of program to be display agree with start time of the last program of NVOD?

S26 Read symbol data of the last program.

S27 Synthesize symbol data on program title

S28 Are titles drawn for all displaying units of frame?

S29 Output, display

END